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Three-semester investigation of participants in reading improvement program showed that these students: (1) Surpassed control students in cumulative grade-point average; (2) made more grade-point averages above 70 than did control students; and (3) had fewer dropouts for entire period of study than did either control group or remainder of freshman class.

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IV-5 (Reading)

INFLUENCE OF A COLLEGE READING IMPROVEMENT PROGRAM ON ACADEMIC PERFORMANCE

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INTRODUCTION

During the last 25 years there has been a steady and widespread increase in the number of remedial[1] reading courses offered at the college level. Studies by Blake (2) and Causey (4) indicate that the number of colleges and universities offering such programs has more than doubled since Charters' (5) study in 1941. Blake's survey (3) suggests that this increase is continuing.

This rapid development of remedial reading courses for college students has been spurred by the research studies which show a close relationship between college success[2] and reading abilities as measured by one or more reading tests (6). These studies also indicate that a large number of college students are seriously deficient in many of the basic reading skills.

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1. The term "remedial" is used in this article to refer to teaching procedures intended to correct faulty reading habits and develop new ones which are more efficient. The term includes procedures sometimes called "corrective."
2. These studies generally use academic grades as a criterion of college success.

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Research aimed at assessing the value of college remedial reading programs has been carried on almost from the beginning of this type of instruction. Reports of this research have been, in the words of Ammons and Hieronymous (1), "almost uniformly optimistic and even enthusiastic." Unfortunately, "most such studies suffer from somewhat inadequate experimental design, particularly with respect to control of practice effects and level of motivation." (1)

Robinson (9), in an article which set the pace for the subsequent research in this area[3], bluntly stated that there was a striking lack of adequate validation data in the field of remedial reading. He asserted:

> Academic performance is clearly the sine qua non for the validation of remedial courses, particularly in liberal arts curricula where by far the largest portion of scholastic agenda comprises reading or related activities. And in the final analysis, remedial instruction must necessarily stand or fall on the basis of this single criterion, however ingeniously alternative standards of comparison are defended.

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3. Virtually all studies concerned with the evaluation of remedial reading programs which were carried on after the publication of this article pay at least lip service to its demand for more adequate experimental controls.

Robinson concluded that remedial programs have not conclusively demonstrated their value. Summerfield (11), in a report made four years later, also found that there is little or no evidence to show that college reading programs have significant long-range effects.

While the situation with regard to the number of studies concerned with evaluating the effect of remedial reading programs on scholastic achievement is considerably better than when Robinson wrote, the results of these studies have been inconclusive except for the research of Kilby (7) and Mouley (8), which did not include measures to control level of motivation.

Virtually all of these studies also gave no evidence of attempts to control variables (such as college curriculum, age, sex, and intelligence) which might have affected scholastic performance as much as or more than the supposedly differentiating factor of participation in a reading program. Some studies even gave no evidence of controlling for differences in initial reading ability. No researcher, except Robinson, gave convincing evidence of having attempted to control initial motivation (although Smith and Wood (10) assume such control).

Robinson (9) pointed out that such neglect of initial level of motivation is striking in view of the voluntary nature of most remedial programs. The students who choose to present themselves for such classes are likely to be those who are most highly motivated. Their performance gain, therefore, would be associated, in part at least, with such motivation.

This study is reported to throw further light on the problem. The investigation compared the academic performance for three semesters of the students who completed the Cornell Reading Improvement Program[4] in the fall of 1954 with the performance of a control group. The study also compared the scholastic attrition during this three semester period with the attrition of the control group. The results of a reading program should not only be demonstrated in terms of academic marks but also in terms of its practical significance, if any, in aiding its students to prolong their "academic life."

SELECTION OF THE SAMPLE FOR THE STUDY

All students enrolled in four-year curricula of Cornell University who completed the Reading Improvement Program in the fall semester of 1954 made up the experimental group, with the exception of:

1. Two students for whom complete test data were lacking.
2. Eight girls, chosen by selecting alternate cases, who had to be excluded to make the proportion of each group equal with respect to sex.

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4. The Cornell Reading Program is a non-credit course. Enrollment is voluntary, and, during the fall semester, restricted to freshmen whose scores on the entrance battery fall in a certain range.

The experimental group numbered 116 students.

The control group was chosen from freshmen enrolled in four-year curricula of Cornell who had applied for admission to the Reading Program for the fall semester of 1954, but who had not been enrolled because of lack of facilities. Letters were sent to 210 of these freshmen who had submitted written applications for enrollment, inviting them to come to a special testing session at night in the early part of November, 1954. All who responded to this request were chosen for the control group, with the exception of:

1. Ten students who subsequently enrolled in the 1955 spring semester classes of the Reading Program. (Efforts were made to dissuade students in the control group from such enrollment. 65 students initially sought enrollment.)[5]
2. Students for whom complete test data were lacking.
3. Students whose native language was not English.

Of the 160 students who took the special test, 142 were placed in the control group.

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5. Of the 142 students in the control group, 91 (64 per cent) subsequently enrolled in and completed the Reading Program by the end of the spring term, 1956.

DIVISION OF THE EXPERIMENTAL AND CONTROL GROUPS

The experimental and control groups each were divided into two subgroups. This division was necessary because two measures of academic aptitude are used at Cornell University. These are the Scholastic Aptitude Test of the College Entrance Examination Board Series (hereafter referred to as the S.A.T.), and the Ohio State University Psychological Examination (henseforth called the O.S.U.).

Students for whom S.A.T. scores were available were placed in experimental and control subgroups A. Students in these subgroups were students from the Colleges of Engineering, Home Economics, and Arts and Sciences. The numbers of students in experimental and control subgroups A are proportional with respect to sex and division of the university.

Students from the College of Agriculture, School of Hotel Administration, and School of Industrial and Labor Relations, whose academic aptitude was measured by scores on the O.S.U., composed experimental and control subgroups B. The numbers of students in the experimental and control subgroups are proportional with respect to sex and college of the university.[6]

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6. Eight girls were excluded from experimental subgroup B in order to maintain this proportionality. These girls were selected for exclusion by taking every alternate girl.

DELIMITATIONS

1. The experimental and control groups are not considered as random samples either of college freshmen in general or of Cornell freshmen. The conclusions, therefore, should not be construed as necessarily applicable to other situations unless conditions of instruction are similar and the groups could reasonably be considered as samples of a population from which the subjects for this study constituted a random sample.[7]

2. Two instructors taught the class sections of the Cornell Reading Program during the fall semester of 1954, each one teaching six of the twelve sections.

3. Scholastic achievement was evaluated in terms of the total grade-point average for individual students.

BASIC ASSUMPTIONS

1. The fact that two instructors taught the Reading Program introduced no significant bias in the study.

2. Motivation was sufficiently controlled by the process

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7. The Cornell Reading Improvement Program is described at length by the investigator in his unpublished doctoral disertation (from which this article is taken): An Experimental Study on the influence of a College Reading Program on Academic Performance. Cornell University, 1956.

used to select the control group. (The level of motivation, in respect to remedial reading instruction, at least, of those students who, although their initial applications for enrollment had been rejected, voluntarily appeared for further testing, is believed to be approximately equivalent to the motivation of actual participants in the program.)[8]

HYPOTHESES TO BE TESTED

1. Students in the experimental and control groups do not differ in academic achievement as measured by:

   (a) College grade-point average for the first semester.

   (b) College grade-point average for the second semester.

   (c) College grade-point average for the first two semesters.

   (d) College grade-point average for the third semester.

   (e) College grade-point average for the first three semesters.

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8. The strength of this motivation is indicated by the fact that 64 per cent of the control group completed the Reading Program by the end of the spring term, 1956. Since another 19 per cent left Cornell by the beginning of that spring term, only 17 per cent did not carry out their declared intention. Robinson (9) reported that 72 per cent of his control group similarly followed through. Smith and Wood (10), who rely on a similar technique for control of motivation in their control group of 21, did not report the extent to which their "motivated controls" carried out their intentions as declared.

2. Students in the experimental and control groups do not differ in their tendency to make semester grade-point averages below 70.
3. Students in the experimental and control groups do not differ in their tendency to remain enrolled in Cornell University.

STATISTICAL PROCEDURES UTILIZED IN TESTING THE HYPOTHESES

Hypothesis (1) was tested by means of the analysis of covariance technique. In each analysis of covariance, verbal and mathematics scores on the January series of the S.A.T., or scores on the O.S.U. Psychological Examination, Form 21, were employed as control variables to remove individual differences in academic ability; the scores on the Vocabulary and Speed of Comprehension sections of the Cooperative Reading Comprehension Test were used as control variables to remove individual differences in intial reading ability; and age (expressed in terms of months) was used as a control variable to remove to some degree individual differences resulting from length of life.

Hypotheses (2) and (3) were investigated by the application of discriminant equations to analysis of covariance. This technique was used to remove variations in individual ability. Since the criterion is a dichotomous variable rather than a continuous one, the discriminant equation was employed (12). Scores on the Vocabulary and Speed of Comprehension sections of the Cooperative Reading Comprehension Test were used to adjust for initial differences in individual reading ability.

Table I gives a comparison of the experimental and control groups with respect to the control variables used. The median S.A.T. verbal scores in 1954 for those colleges of Cornell University which require the S.A.T. of all applicants were 584, 560, and 514; median S.A.T. math scores were 572, 633, and 513. Twenty-seven per cent of the verbal scores were over 600; 74 per cent were over 500; 47 per cent of the math scores were over 600; 82.8 per cent exceeded 500.

The O.S.U. Psychological Test is administered during Orientation Week to those freshmen who were not required to take the S.A.T. as a prerequisite to admission. The median O.S.U. score for this group in 1954 was 80; the mean score was 80.4. Fifty per cent of the students made scores between 61 and 97. It should be noted that this test is given according to local procedures and, therefore, the scores are not comparable to published norms.

The subjects in this study are thus students of below-average academic ability as measured by Cornell standards. Table I shows that the experimental group is less capable academically, as measured by the tests used, than is the control group. Neither group, however, is characteristic of the freshman class entering Cornell in 1954.

TABLE I

A COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS WITH RESPECT TO CONTROL VARIABLES USED IN THE STUDY

GROUP A

	EXPERIMENTAL		CONTROL	
Variable	Mean	Standard Deviation	Mean	Standard Deviation
Age	218.5	4.8	219.0	4.4
Coop Speed of Comprehension Score	53.4	5.2	61.5	5.3
Coop Vocabulary Score	57.2	5.8	59.0	5.5
SAT Verbal Score	470.4	67.8	506.2	56.7
SAT Math Score	543.0	85.1	568.5	86.5

GROUP B

	EXPERIMENTAL		CONTROL	
Variable	Mean	Standard Deviation	Mean	Standard Deviation
Age	232.3	27.2	224.4	21.8
Coop Speed of Comprehension	54.0	4.5	59.5	6.2
Coop Vocabulary Score	56.4	5.5	58.8	6.8
O.S.U. Score	71.5	12.8	78.5	23.7

FINDINGS

Comparison of the experimental and control groups with respect to achievement in Cornell University, as measured by grade-point averages, showed that the experimental group significantly exceeded the control group in first semester grade-point average; in cumulative grade-point average for two semesters; and in cumulative grade-point average for three semesters.

The differences between the groups in grade-point average for the second and third semesters were not statistically significant. The difference between the groups, however, in regard to second semester grade-point average closely approached statistical significance (F= 3.75). The following factors may have operated to produce this result: (1) the higher percentage of dropouts which occurred in the control group than in the experimental group; (2) adjustment to college work for the survivors of the control group. These factors resulted in the control group becoming more select. Unless one is willing to admit that students can learn to read and study efficiently only in a reading program, the best preparation for succeeding semesters of college work for those students who survive (academically) is presumably the work of the preceding semesters.

Comparison of the experimental and control groups with respect to the tendency to make semester grade-point averages below 70 showed that students in the control group significantly exceeded students

in the experimental group in the number of first and second semester grade-point averages below 70. No significant difference was found between the groups for the third semester. This change of trend was probably due to the increased selectivity of the control group.

Investigation of the numbers of dropouts in the experimental and control groups showed that significantly fewer students in the experimental group dropped out of Cornell during the period of the study than was the case for the control group. Comparison of the dropout record of the experimental and control groups with that of the remainder of the freshman class of 1954 showed a significant difference in favor of the experimental group. Comparison of the dropout record of the experimental group with that of the remainder of the freshmen class of 1954 (including the control group) showed that the statistically significant difference found between the experimental and control groups did not result from a sampling artifact--i.e., the control group did not have an abnormally high dropout rate in comparison with the rest of the class from which it was drawn. The investigation showed, rather, that the experimental group had a markedly lower dropout rate than the class from which it was drawn (chi-square value = 4.65). This is notable in view of its less favored position relative to the measures of scholastic aptitude used.

TABLE II

COMPARISON OF GRADE*POINT AVERAGES

Period	N	Experimental A	N	Control A	N	Experimental B	N	Control B
Semester	51	77.2*	72	73.1*	65	75.0*	70	72.5*
Second Semester	50	76.8	70	75.6	64	74.9	65	73.9
Two Semester Cumulative	51	77.4	72	73.8 *	65	75.3*	70	72.5*
Third Semester	48	76.7	61	76.6	57	75.8	53	75.6
Three Semester Cumulative	51	76.9*	72	74.4*	65	75.4*	70	72.8*

* Grade-point average adjusted for individual differences as measured by control variables.

TABLE III

A COMPARISON OF STUDENTS IN THE EXPERIMENTAL AND CONTROL GROUPS WITH RESPECT TO THE PERCENTAGES OF DROPOUTS FOR THREE SEMESTERS CUMULATIVELY

Experimental = X — Control = C

Number of Cases = 116 — Number of Cases = 142

Semester	Group	Number of Dropouts	Per Cent of Dropouts	Chi-Square Value	F Value
1	X	2	1.7		
	C	7	4.9	-----*	
2	X	9	7.7		
	C	26	18.3	6.07**	12.71***
3	X	10	8.6		
	C	28	19.7	6.20**	11.44***

* Insufficient number of cases in each group for reliable chi-square.

** Significant at the 5 per cent level of confidence.

*** F-value obtained by discriminant equations significant at 1 per cent level of confidence.

DISCUSSION AND SUMMARY

The preceding summary of the results of a three-semester investigation leads to conclusions which suggest the influence of the Reading Improvement Program on the academic performance of Cornell students.

Insofar as the measures used controlled individual differences in academic ability and initial reading ability, and insofar as no other pertinent but uncontrolled influences related to academic achievement created an important bias, students who completed the Cornell Reading Program:

1. Significantly surpassed students in the control group in regard to cumulative grade-point average for all three semesters of the study.

2. Made significantly more grade-point averages above 70 than did students in the control group. (Thus, the higher mean grade-point averages found for the experimental group were not achieved through the combination of many low grade-point averages with a few extremely high ones while most of the control group was achieving satisfactory grade-point averages with only a few of its members making low averages. On the contrary, a significantly greater proportion of low grade-point averages were made by students in the control group.)

3. Had significantly fewer dropouts for the entire period of the study than did either the control group or the remainder of the freshman class.

By the end of the third semester, 106 of the original 116 members of the experimental group survived (a staying power of 91.4 per cent), as compared to 114 of an original total of 142 for the control group (80.3 per cent). In view of the preceding findings, the conclusion seems justified that the greater staying power of the experimental group was not achieved at the expense of academic achievement as measured by grade-point average.

Despite the increasing selectivity of the control group, due to its greater dropout rate, and despite the continuing inferiority of the experimental group in academic aptitude, as indicated by the measures used, students who completed the Cornell Reading Program surpassed students in the control group in the three phases of academic performance investigated by this study.

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